GARDEN AND FOREST.

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A Great Battle Park.

THIS week will witness the dedication, with imposing ceremonies, of the great national park, which includes the battlefield of Chickamauga, with parts of Missionary Ridge, Lookout Mountain and other places made memorable by that long struggle which, in the magnitude of the forces engaged, the number of lives sacrificed and the importance of the results which depended upon it, ranks among the great battles not only of our Civil War, but of the world. The field of Chickamauga embraces fifteen square miles, much of which is in forest, and, besides this, the Government has acquired and improved in a most substantial manner scores of miles of road by which the armies marched to the field or left it. The city of Chattanooga, too, which, with its surroundings, made one great battlefield, has made liberal grants of land for the erection of monuments and built a great central drive to the park, along Bragg's line of battle on the crest of Missionary Ridge and through the field of Chickamauga to a point twenty miles away.

Of course, this is not intended as a pleasure-ground. What has been attempted is a restoration of the country to its condition at the time when the battles were fought, with the placing of such monuments and tablets at critical points as will indicate the battle lines and movements of the various bodies of troops throughout the whole series of engagements. Tall observation-towers are to be erected from which the mountain ranges and the rivers can be seen at a glance, so that the strategy of each army can be studied and the history of every operation on these famous fields can be accurately seen. When all is completed it will be possible for the visitor to gain a clear idea of the great military movements across the broad river, among the forests and on the mountain sides. Nowhere else in the world is there an object-lesson approaching this in magnitude of completeness of treatment.

In the current number of *The Century Magazine* General Boynton gives an admirably clear, though concise, account of what has already been done and what it is proposed to do. Commissioners are now at work defining the fighting lines, and it is stated that 106 monuments and 150 granite markers are to be finished and set up before the dedication, besides 129 of these memorials already in place. What we desire especially to call attention to here, however, is an editorial note in the same magazine in reference to the service which art can render in celebrating the heroes of those days of flame. Upon this hallowed ground something more than historic accuracy is needed, and the appeal to the imagination ought to be made as distinct and powerful as possible. Of course, no art can make Lookout Mountain or Missionary Ridge more impressive than they are, but memorial structures can be erected here which will distract the attention by their obtrusiveness, and if they lack dignity or propriety they will help to belittle the legitimate impressions which the spectacle ought to create. It is truly said in the article alluded to that "there are few pieces of good sculpture on the battlefield of Gettysburg besides the beautiful and appropriate Celtic cross which marks the position of the body of Irish troops. There are a few unobtrusive pieces of natural rock which fittingly express the willing sacrifice or unyielding valor, but, for the most part, that beautiful chosen valley of the nation's salvation has become, through lack of coördination in plan and good taste in execution, an unsightly collection of tombstones." As the fields of Antietam and Shiloh are now coming under Government control, these great battlefields should not be allowed to become mere cemeteries, and without a protest. To this end certain practical rules are laid down which deserve careful consideration. These are so sound and so judiciously set forth that we reproduce them in full:

1. Every commission should avail itself of the advice of the best landscape-architects, so that park-like effects may be attained as far as may be consonant with the more practical objects of the reservation.

2. Lines of battle should be marked clearly, but unpretentiously, with a low uniform stone, and the whole plan should be worked out artistically before large monuments are erected.

3. The commission should have the advice of a competent board of sculptors, and should be guided by them in the acceptance of plans for monuments.

4. The monuments, to be of artistic excellence, must be few; and to this end the unit of celebration, so to speak, should be the corps. The sense of historical perspective is lost by allowing each regiment to determine the proportions and character of the memorial.

One can hardly hope that the 385 monuments and markers already, or soon to be, in place in Chickamauga are all worthy of the heroic deeds they commemorate, and it is not reassuring to be told that 3,500 acres of forest have been cleared of underbrush and smaller timber so that carriages may be driven through every portion of the park. But every thoughtful person will approve the suggestion that no work of this sort be done in future without "a severe artistic supervision, such as made the Court of Honor of the Columbian Exposition the admiration of the world."

Forests and Rivers.

ONE of the interesting papers read at the Forestry meeting at Springfield, Massachusetts, was that of Mr. C. C. Vermeule, consulting engineer of the Geological Survey of New Jersey, and it related to his investigations of the water-supply resources of that state, an important matter, since considerably more than a hundred million gallons of water are every day consumed by about a million inhabitants. Mr. Vermeule made a personal study of certain watersheds in New Jersey for four years, and, in addition to his own data, he used for comparison a long series of measurements of streams in New England and the middle states. Taking evaporation to mean the difference between the total rainfall and the total run-off of the streams, his conclusions, briefly stated, are that the amount of rain evaporated was not proportioned to the total rainfall, as is often assumed to be the case. Evaporation increased slightly with increased rainfall, but very rapidly with increased temperature of the atmosphere. The stream-flow was found to depend upon the rainfall in connection with the temperature, and little effect upon the run-off was traceable

to forest, to other vegetation or to topography. Examples in three river basins, one of which contained fourteen per cent. of forest, another thirty per cent., and a third forty-four per cent., all showed the same total flow-off for a given annual rainfall, the varying forest areas seeming to have no effect upon evaporation. The Connecticut showed much less evaporation than the Potomac, with about the same proportion of forest, but with a temperature of 2.7 degrees lower, and generally evaporation was found to vary with the mean temperature without regard to the amount of forest. A great number of observations seemed to substantiate this theory, and the conclusions were that in New England and the middle states the effect of forests upon the total flow-off of the streams is not important enough to be shown in the measurements. The influence of the temperature of the air upon evaporation will be appreciated when it is understood that the moisture which is held in the air is doubled for each increase of twenty per cent. in temperature.

In studying the effect of forests upon the greatest and least flow of streams no effect due to the forests was discovered. The heaviest freshet usually occurs when the ground is frozen and warm rain comes on a heavy covering of snow, or else in summer when a heavy rain falls upon the ground already saturated. The rate of flow-off is then determined mainly by topography. The lowest flow occurs when the stream has for a long time been drawing upon the stored ground-water, and has drained it to a point below which it can be influenced by surface conditions. The rate of flow is then mostly affected by the capacity of the earth for holding water and its rate of yielding it up. This is not a matter of vegetation, but of surface geology, and for this reason it is thought the forests have little effect upon the greatest or least rate of the flow of the streams.

These results, it ought to be said, were questioned by some of the experts present, especially because there are no instruments which give perfectly reliable measurements. They are altogether negative, however, and they do not imply that a covering of forest exercises no beneficial effect upon the water-supply. Mr. Vermeule explained that his studies make it clear that streams are often supplied for many months entirely from water stored in the ground. For example, in 1881 the Passaic River was supplied for eight months in this way. With only rain enough to make good evaporation, land in New Jersey will yield up in nine months ground or spring water equal to from 2.29 to 7.59 inches of rainfall. Small barren redstone catchments yield the least water, and the sand and gravel of the tertiary formation the most. If the rain falls uniformly, from two to two and a half inches a month may be taken into the ground and discharged thence into the streams. The entire rainfall of an average year, less the evaporation, could be thus taken into the earth and none need flow over the surface into the streams. Anything, therefore, which affects the capacity of the earth to take up water and to control its rate of discharge into the streams affects the stream-flow by making it more or less uniform throughout the year. And here the generally recognized good effects of a forest-cover in holding back water until the earth can take it up are seen. The basins which have the largest proportion of forest invariably showed the best-sustained flow in a dry season, although the total run-off was no greater. The streams of southern New Jersey which have the most forests are remarkably steady, the dry-season flow averaging twice as much as that of the northern rivers. This is due, undoubtedly, in large part to the absorbent power of the sandy soil; but a critical study of the daily flow of these rivers shows that the Cedar swamps contribute largely to the result. Should these be all cut off the streams would certainly suffer and become more unreliable. The conclusion of Mr. Vermeule's interesting paper is as follows:

It will be seen that as to cultivated and forested catchments our gaugings indicate the same total run-off for a given rainfall, but a much more uniform discharge, fewer floods and shorter dry periods on the forested areas. Forest streams are consequently more valuable and reliable for power, and for water-supply they require less storage capacity to provide for a given daily draught. The waters are also much less likely to become muddy or otherwise contaminated. The worst condition of all for a catchment is barrenness. Barren earth is non-absorbent. The water soon fails to penetrate it and oxidizes its fertilizing constituents. Heavy rains run over the surface, wash off all the loose materials, and barren conditions once begun perpetuate themselves. There is always danger of such conditions when slopes or other areas unfit for cultivation are deforested, and there is special danger where forest fires are prevalent. There are a few small red sandstone areas in New Jersey now in this condition, where the streams dry up for weeks in succession to become torrents when the rain falls in considerable quantity. Compared with barrenness, cultivation is harmless to the stream. Our end, therefore, should be to keep all ground unfit for cultivation clad with forest.

Cladrastis.

IN 1824 Rafinesque published his *Neogenilon*, a pamphlet of four pages, in which he characterized sixty-six new genera of plants. The first of the list is Cladrastis, proposed to receive the leguminous tree which the elder Michaux had discovered in 1796 and named Virgilia lutea. No reference to an earlier publication of Cladrastis is made in the *Neogenilon*, except the general introductory remark that some of the new genera "were indicated last year, 1824, in the catalogue of the Botanic Garden which I have tried in vain to establish in Lexington." Dr. Call, in his exhaustive *Life and Writings of Rafinesque*, recently published by the Filson Club, of Louisville, Kentucky, does not include this catalogue in his list of Rafinesque's writings, and probably it was never published; but in the first volume of the *Cincinnati Literary Gazette*, published in 1824, which has recently come into my hands for the first time, the genus Cladrastis is carefully described on page 66, issued February 21st, and this, therefore, is an earlier publication of the genus by a year than that in the *Neogenilon*, and it is probably the earliest. On the same page of the *Cincinnati Literary Gazette* the species is mentioned as Cladrastis fragrans, which thus becomes another synonym of Cladrastis lutea of Koch, Virgilia lutea of Michaux, and Cladrastis tinctoria of Rafinesque in the *Neogenilon*.

C. S. S.

Notes on some Arborescent Willows of North America.—II.

Salix taxifolia, H.B.K., southern Arizona, Rillita River (Pringle, 1883), Santa Rita Mountains (Professor Toumey).—A moderate-sized tree, thirty feet in height, with delicate spray, the lower branches drooping. Compared with extreme Mexican forms of the species, for instance Dr. Palmer's specimens (1193) from Colima, there is in the Arizona plant more or less variation in the direction of Salix longifolia. But S. taxifolia, like other members of the group to which it belongs, is exceedingly variable. The fertile aments in Mr. Pringle's specimens are rather oblong-cylindrical than "sub-globose," and in both the Arizona collections the leaves are larger. Nevertheless, the narrower and longer aments are more than matched by Mr. Brandegee's specimens from Lower California, otherwise characteristic taxifolia; and the larger leaves are apparently only the result of a less starved and stunted growth. A form collected by Mr. Pringle "in the valley near Chihuahua" is identical with his Arizona specimens.

Salix lasiandra, Bentham, var. caudata, Sudworth, *Bull. Torrey Bot. Club*, xxii., 43 (1893). S. lucida, var. lanceolata, Hooker, *Fl. Bor.-Am.*, ii., 148 (1839). S. pentandra, var. caudata, Nutt., *Sylva*, i., 61, t. 18 (1842). S. Fendleriana, Andersson, *Proc. Am. Acad.*, iv., 54 (8) (1858). S. lasiandra, var. Fendleriana, Bebb, Watson & Brewer, *Bot. Cal.*, ii., 84 (1880).

Mr. Sudworth is right; the older name of Nuttall

ought to have been maintained.* In point of fact, however, the oldest name for this Rocky Mountain Willow is Salix lucida, var. lanceolata, Hook., the type of which in the Kew Herbarium is No. 39 of the "Hooker, Barratt and Torrey" distribution, collected in the Rocky Mountains by Drummond. But lanceolata is a homonym, several times over, and, therefore, unavailable, according to the rule maintained by Professor Sargent in the *Silva of North America.*

SALIX FLAVESCENS, Nutt., var. capreoides (Andersson). S. capreoides, Andersson, *Proc. Am. Acad.*, iv., 60 (14). S. flavescens, var. Scouleriana, Bebb, *Watson & Brewer, Bot. Cal.*, ii., 86. S. brachystachys, Bentham, var. Scouleriana, forma crassijulis, Andersson, DC., *Prod.* xvi., part ii., 224. S. Scouleriana, Barratt, sec. Hooker, *Fl. Bor.-Am.*, ii., 145 in part.—The old name of the *Flora Boreali-Americana* was discarded by Andersson because he found that the type specimens in the Hookerian herbarium consisted of flowers of Salix flavescens and leaves of S. Sitchensis "glued to the same sheet." S. Scouleriana thus becomes a synonym of both these species in part, and, therefore, is not available for a specific name. For the same reason it cannot be used for a varietal name. We, therefore, fall back upon S. capreoides, Andersson, as next in point of date. In its restricted form this does not well represent the variety of our north-west coast in its widest departure from the Rocky Mountain type, but it is unquestionably a synonym of a so-called Scouleriana, and later was so regarded by Andersson himself.

SALIX MISSOURIENSIS, n. sp. S. cordata, Muhlenberg, var. vestita, Andersson, Monog. Sal. 159, and DC., *Prod.* xvi., part ii., 252. Fort Osage on the Missouri River (Neuwild ex Andersson). Near Courtney, Jackson County, Missouri, only twenty miles from the original locality (Professor Sargent, Mr. B. F. Bush). Nebraska (Ex-Governor Furness). —A symmetrical tree with a slender top, thirty or forty, or even fifty, feet in height, trunk ten or twelve, rarely eighteen, inches in diameter. One-year-old twigs stout, tomentose; leaves lanceolate or oblanceolate, five to six inches long, from one to one and a half inches wide, cuspidate-acuminate, narrowed from above the middle toward the acute or rounded (but not truncate or cordate) base, at first more or less clothed with silky hairs, soon smooth and dark green above, except the downy midrib paler, but not glaucous beneath, margin glandular-serrate; petioles downy, half an inch long, stipules large, semi-cordate and pointed, or more rarely reniform, obtuse; aments appearing before the leaves, sessile, densely flowered, the male oblong-cylindrical, one and a half to two inches long, half an inch thick, the fertile lengthening to three inches and becoming more or less lax; scales (relatively) large and very conspicuously invested with long, straight, silvery hairs; capsules glabrous, rostrate from a thick base, pedicel (relatively) short, three times the length of the gland and not exceeding the scale; style medium, stigmas minute, entire. The name vestita, being preoccupied, is changed to one indicative of the habitat of the species, which, so far as known, does not extend beyond the banks of the Missouri. "The aments usually open about the first of February and have passed out of bloom by March 1st, whereas those of Salix cordata do not appear till the first week in April." (Bush.) For one of the Cordatæ, the extraordinary height and size of trunk attained by this Willow, the repeated durability of the wood for fence-posts, its early period of flowering, together with the technical characters above given, would seem to amply warrant its elevation to the rank of a valid species. At all events, as such, it is much more likely to receive that further study and criticism which will determine its true status, than if left as a doubtful variety within the limits of such a polymorphous species as S. cordata. The sessile, thick, very silky pistillate aments, before expansion, resemble those of S. discolor.

Salix Missouriensis has been mixed up with the so-called "Diamond Willow" of the upper Missouri, but is there any reliable evidence of any connection whatever between the two? Several years ago Professor L. F. Ward collected leaves of the "Diamond Willow," which are those of genuine S. cordata. A section of the stem, showing the peculiar arrest of wood-growth at the base of the atrophied twigs, taken at the same time and measuring two inches in diameter, indicates an annual wood-growth of one-twentieth of an inch. We may readily see how the heart-wood in such a case might have a closeness of fibre "equal to Red Cedar"; but of all the members of the cordate group, S. Missouriensis, with its remarkable vegetative vigor, would be the last that would be suspected of growing two inches in diameter in twenty years! Has a stick of "Diamond Willow," with the "diamonds" on it, so there could be no mistake, ever been seen large enough for a fence-post? After all the attention directed to this "Diamond Willow" more than fifteen years ago, and the widespread interest which was manifested at the time in a matter which, as set forth, seemed to present important economic considerations, it is, indeed, strange that the intervening years have yielded so little in the way of verified knowledge of the facts.

Rockford, Ill. *M. S. Bebb.*

* The work on the Willows of California, undertaken at the request of Dr. Watson, was almost the beginning of my special study of our western Willows. In those days I was just a bit overawed by high authority, nor did I know then, as I came to know later on, how prone Professor Andersson was to minimize, if not to altogether ignore, the work of Nuttall, or I would have seen the propriety of reinstating Nuttall's name.

Foreign Correspondence.

London Letter.

NOT only was the display at this week's meeting of the Royal Horticultural Society large and brilliant, but many novelties were shown, notwithstanding that this is the dull season when every one who can get away is out of town. A great gathering like that on Tuesday indicates how active is the interest in horticulture here since it can induce so many amateurs and professional growers to devote a day each fortnight for the admiration of the new and rare plants that have come into season since the preceding meeting.

The brilliancy of the exhibition was chiefly due to the magnificent array of Gladioli, new hybrid Cannas, Dahlias and the finest types of hardy perennials. Kelway's display of Gladioli was finer than I have seen for years, owing, perhaps, to the exceptionally warm early summer or to the excessive rains during the past month. There were no fewer than fourteen dozen flower-spikes, the majority fully eighteen inches long. Many new seedlings were exhibited for certificates. None of these showed any decided break from the usual range of colors, less, indeed, than might be expected, since attempts have been made to intercross the novel and strange tints in Lemoine's race of Gladioli with those of the older Gandavensis race. The most striking variation in the new kinds seemed to be those which have resulted from crossing the wide-open flowering G. Saundersi with the best of the old Gandavensis type. Some of these were recognized by the committee as an advance upon old sorts. These Saundersi hybrids could readily be distinguished by the much more open and larger flowers, the recurving lateral sepals and downward tendency of the upper sepal, which characterizes in a marked way the typical species. The color also is, as a rule, more intensely scarlet, with a paler centre. The sorts certificated were named Kate Rose, pale rose tint, penciled with crimson; Brantford, intensely deep crimson, the darkest tint yet seen; Dalops, deep crimson flaked with a deeper hue. Other extremely fine sorts were Opiter, Gildo, Crœsus, Ollius and Dunora. There is certainly not another class in the whole range of cultivated plants that can make so brilliant a display as Gladioli. It is to be regretted that they are so capricious under cultivation and can only be grown to perfection where the conditions exactly suit them

as regards soil and climate, and in the open air, for they cannot be grown well under glass.

Dahlias made quite a show, the tendency of the popular taste being for new kinds of the Cactus-flowered race. The true Cactus-flowered Dahlias are certainly exquisite flowers, and this season there are fewer spurious Cactus-flowered kinds and more of the true Juarezi type, with long, narrow-quilled florets that radiate inward instead of recurving. The colors of some of the new Cactus sorts are splendid and quite unlike the shades commonly seen in flowers of the other classes. We have now a pure yellow Juarezi in J. N. Roach, a pure white in Mrs. Peart, a delicate salmon pink in Miss I. Cannell, a deeper scarlet than Juarezi itself in Mrs. Burke and Glorious, while in Mrs. Cannell we have an indescribable tint like the nankeen color of Lilium testaceum. Mr. Turner's new Cactus sorts are of magenta tones; of these the best shown are Leonora and Beatrice, with Atalanta as an exquisite blush, and Mrs. Turner a finer flower than the yellow J. N. Roach. I noticed last week at the great exhibition at the Crystal Palace that Cactus varieties outnumbered the others something like ten to one, and those of the lumpy show kinds of our boyhood days were scarce.

The Cannas were from Messrs. Cannell, who are among the principal growers and introducers of these increasingly popular plants from the French and German cultivators. There were numerous new varieties shown, but none of this year's novelties, in my opinion, eclipse some of the older kinds, though a few show original markings and combinations of colors. Those worthy of special note were Colibri, pale canary-yellow, with a blotch of deep crimson in the centre—this is quite distinct in color; Quasmoda, vivid scarlet, broad petals sharply edged with yellow; Beauté Poitevine, brilliant scarlet and large; Aurore, very large flower, glowing scarlet; Madame de l'Aigle, scarlet, with yellow edge, in the way of the German Königin Charlotte; Sunset Glow, orange-scarlet, yellow edge. These are all first-rate Cannas, but I do not see that such fine sorts as Madame Crozy and Star of Ninety-one are eclipsed in their particular colors by the new kinds. This has been, one would think, a favorable season for open-air culture of Cannas, but the best I have seen are not to be compared in growth and flowers with those I have seen in the United States, or in India during the winter season, when they bloom continuously for four months if the seeds are constantly picked of. In England I fear we shall always have to grow these beautiful plants under glass.

Orchids were plentiful, and, besides some old favorites shown as good examples of cultivation, there were several new hybrids from some choice collections. From Mr. Ingram there was a remarkable hybrid between Lælia Turneri Elsteadensis and Cattleya maxima Peruviana, named Lælio-Cattleya Charles Darwin. The features of both parents are distinctly recognized in the progeny. The form is more like that of the Lælia, as the sepals stand out rigidly at an acute angle and are deep plum-purple color, while the lip is as broad as in Cattleya maxima, of an intensely rich amethyst tint, crumpled at the margins, with yellow centre. It is a superb plant. Another hybrid from the same collection was Cattleya Elstead Gem, between C. bicolor and C. xanthina. The flowers are of medium size, with clear yellow sepals, crimson labellum and white centre, a striking harmony of tints. Mr. Statter's group was remarkable for the rare C. callistoglossa, a cross between Lælia purpurata and Cattleya gigas. C. Rex recalled a fine form of C. Mendeli, the lip having the same form and color and being exquisitely fringed with white. Lælia elegans Oweniæ is probably the finest variety yet seen; the sepals are of a much deeper color than those of Turneri or prasiata. It was unanimously awarded a certificate.

Sir Trevor Lawrence showed the rare Catasetum Bungerothii, the large flowers of pure ivory-white borne on a spike a foot long. The heart-shaped lip is two inches across, with a conspicuous blotch of orange-red in the centre. He also showed such rarities as Pachystoma Thompsoniana, Odontoglossum Krameri and Cypripedium Morganiæ Burfordiensis, which is regarded as better in every respect than the original hybrid named in honor of Mrs. Morgan. It is, in my estimation, even finer than its exceedingly rare parent, C. Stonei platytœnium. Messrs. Veitchs' large contribution of Orchids included, among the more noteworthy, specimens of Cœlogyne Veitchii, with elegant spikes of fine white flowers. This is a valuable addition to the genus, and was considered worthy of a certificate. The white Cattleya Eldorado, which has only a blotch of yellow in the throat to mar its purity, is as rare as it is beautiful. Some additions to the apparently never-ending novelties among hybrid Cypripediums also came from Messrs. Veitch. C. Warnhamense, between C. Curtisi and C. Philippinense, was the chief attraction, as it is a cross between the uniflorous and the multiflorous sections, but it most resembles C. Curtisi. Cattleya Dowiana and its variety aurea have just come into bloom, and some splendid examples of the hybrids were shown that have been obtained from them. The variety named Mrs. Hardy is one of the most gorgeous Orchids I have seen. It is best described as a pale C. aurea, the sepals being almost white. C. aurea Statteriana, on the other hand, has the labellum nearly wholly of a bright yellow, with only a few markings of crimson. The Orchids shown as examples of culture included a magnificent Vanda cœrulea with eight spikes. It represented the largest-flowered variety with those singular checkered sepals that are only met with in such forms as Burfordiana. This was shown by Mr. Woodall, who also exhibited a specimen of Odontoglossum coronarium, one of the mountain species that are so difficult to manage and are rarely seen in flower. It has a large cylindrical spike of flowers of the richest yellow and chestnut-brown. It is grown in the coolest house, and very moist, under conditions suited to the Masdevallias of the Chimera type. It is kept constantly saturated. There was nothing so attractive in Messrs. Sanders' large group as the charming Habenaria carnea and its pure white variety nivosa. It is a dwarf terrestrial species with erect spikes and broad heart-shaped lips. The delicacy of tint in the variety carnea has no equal even among the multitude of Orchids.

Kew. *W. Goldring.*

New or Little-known Plants.

Litsea geniculata.

THIS pretty plant is of particular interest to American botanists as the only representative in the flora of the United States of a large genus otherwise, with the exception of five or six Mexican species, confined to tropical continental Asia, the Malayan Archipelago, China, Japan, Australia, New Zealand and New Caledonia. It is a deciduous-leaved shrub with slender stems, often ten or twelve feet high, spreading branches, and thin zigzag branchlets. The small yellow flowers are borne in few-flowered umbellate heads surrounded by involucres of from two to four leaves, and appear in February before the leaves, which are oblong, acute, thick and coriaceous, dark green on the upper surface, yellow-green on the lower, and rather less than an inch long. The fruit, which ripens in the early summer, is globose, bright red, and about a quarter of an inch in diameter; its structure, as well as that of the flowers, is shown in our illustration on page 375 of this issue, from a drawing made by Mr. Faxon from material furnished by Dr. J. H. Mellichamp, of Bluffton, South Carolina.

Litsea geniculata is distributed from southern Virginia to Florida, where it grows in swamps in the immediate neighborhood of the coast. Although a rare plant, the Pond Spice, the name by which this shrub is generally known, was discovered before the middle of the last century. It was introduced before 1810 into Fraser's nursery at Sloane Square, in London, where it flowered in that year; and an excellent

figure made from this cultivated specimen was published in *The Botanical Magazine* two years later (xxxv., t. 1471). It probably will not be found now outside its native swamps.

The very complicated synonymy of the Pond Spice is displayed on page 276 of Mez's Monographia Lauraceæ Americanæ in the fifth volume of the *Jahrbuch des Königlichen Botanischen Gartens und des Botanischen Museums zu Berlin.* C. S. S.

Plant Notes.

NYSSA SYLVATICA.—The Tupelo, or Pepperidge, as it now appears in Central Park and on some of the rugged slopes in the northern parts of Manhattan Island, is certainly one of the most picturesque and distinct of our native trees. We have already figured this tree in a group (vol. iii., p. 490) and as a single specimen (vol. vii., p. 275), and have described it so frequently that there is little to add here, beyond calling attention again to its singularly clean, dark green and glossy foliage in the summer, its fiery colors in autumn, and its ever-graceful and individual habit. Like many other trees which grow naturally in damp soil, it flourishes well on uplands, especially where the soil is warm and rich. Indeed, in the mountains of Carolina and Tennessee it attains its largest size on elevated slopes. Some of the trees in Central Park carry their branches in horizontal strata around the central stem; in others these branches droop at the extremities, while others still form close, round-headed tops; but all of them are graceful. Already there are branches here and there on which the leaves begin to glow with the scarlet which will make them in a few weeks rivals of the Sweet Gum and the Flowering Dogwood. It is almost useless to attempt to transplant large trees of this species from the woods, but the seeds germinate readily, and if often shifted in nursery rows, young trees can be moved without difficulty.

RUDBECKIA SUBTOMENTOSA.—This is one of the very best of the tall composites which are so interesting at this season of the year. It is a plant of branching habit which grows four feet high, and its bright yellow flowers are produced in large numbers and for a long time. It is the best of the larger Cone flowers, and if it can have a good stiff soil in full sunlight it will always make a striking and showy plant. The cones are dark brown and hemispherical, and the florets are a bright yellow, about an inch long, and being rather narrow they are quite separate and give the flowers a very distinct and interesting appearance. Of course, there are many other excellent Cone flowers. Rud-

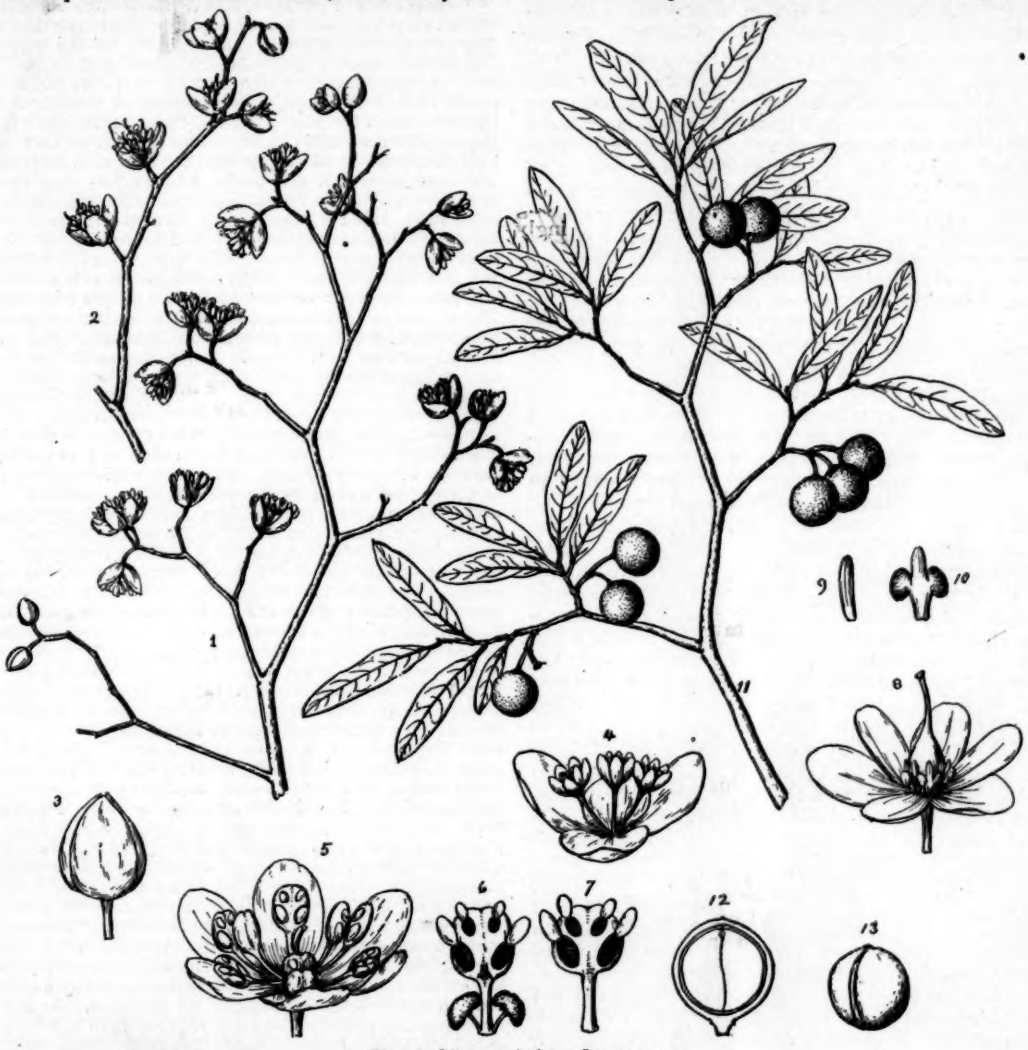

Fig. 52.—Litsea geniculata.—See page 374.

1. A flowering branch of the staminate plant, natural size. 2. A flowering branch of the pistillate plant, natural size. 3. A flower-bud, enlarged. 4. An umbel of flowers with its involucre, enlarged. 5. A staminate flower, enlarged. 6. A stamen of the inner rank with its glands, front view, enlarged. 7. A stamen of the outer ranks, front view, enlarged. 8. A pistillate flower, enlarged. 9 and 10. Staminodia of the pistillate flower, enlarged. 11. A fruiting branch, natural size. 12. Vertical section of a fruit, enlarged. 13. A nut, enlarged.

beckia speciosa, which grows to a height of two or three feet and bears flowers three inches across, is especially good. R. laciniata is one of the taller kinds and is quite desirable.

Billbergia rhodo-cyanea.—Many plants belonging to the Bromeliaceæ are exquisitely beautiful, but few or none of them excel this rare free-flowering species. Side by side with some of the most beautiful Orchids it easily holds its own. The harmonious combination of its delicate tints, its bold habit, its regular and finely marked foliage, render it a thing of real beauty. The flowers are two inches long in close, bracted heads, clear-blue in the bud, and lilac when open. The petals are twice as long as the delicately rose-colored sepals; the style and anthers white; the lanceolate bracts, with recurved spiny edges, about two inches and a half long, beautifully rose-colored; the peduncle ten to twelve inches high, green, and clothed with whitish wool; the leaves eight to ten in a rosette, broad, lingulate, with a sharp spiny point, edged on the upper half with black spines, and on the lower half suffused with blackish purple, and on the outside transversely lined and spotted with white puberulent markings. This species, like all Billbergias, grows well in a compost of fibrous peat and sphagnum in wooden baskets or well-drained pots. Frequent watering with liquid-manure helps the growth, and pieces of cow-manure in the compost are almost equally good. The soil should be kept constantly moist, and frequent syringings are needed in summer. After flowering, the growth generally dies more or less slowly; it may keep beautiful for some time after, but never increases in size. At the base of the growth, which, after flowering and fruiting, has fulfilled its purpose, several young growths appear and soon develop to normal size if the root is healthy; these may be taken off and used for propagation. They should be potted in the usual compost, kept warm and shady and moderately watered. Partial shade is always necessary, and from seventy to eighty degrees, Fahrenheit, is a suitable temperature.

Hibiscus Cooperii tricolor.—While the typical Hibiscus Cooperii sometimes loses the mottled color of its leaves, which gives the plant its ornamental value, this highly colored variety is quite constant and also more beautiful both in habit and in color. The leaves are ovate-lanceolate, with irregularly and coarsely serrated edges. The color is very vivid, especially in the young leaves, dull green, splashed with pure white, and edged with crimson. The habit is very neat and compact, and if well grown there are few better plants for table decoration. It is propagated by cuttings, like ordinary forms of Hibiscus rosa-sinensis. The soil, to develop the highest possible color, should be very rich and the position a sunny one. During the summer watering should be abundant, while a partial rest during winter is beneficial. Young, not too large, plants are the best in every way.

Thunbergia (Meyenia) erecta.—This very floriferous, ever-blooming Thunbergia is not a climber, as are most other species. It is a stiff, erect-growing shrub, said to attain a height of six or more feet in its native country. The opposite ovate-lanceolate leaves are two to three inches long. The flowers are borne singly from the axils of the leaves and are about three inches long, with an inflated, curved tube and five large orbicular segments of equal size. The corolla is fully an inch and a half across, and the calyx consists of ten to twelve acicular segments half an inch long, and the two-leaved epicalyx larger than the calyx and enclosing it. The color is a deep bluish purple, with an orange throat. Plants will flower quite freely, even when only a few inches high. Ordinary greenhouse treatment is sufficient. This is a promising plant for window-gardening where a bright and airy position can be had.

Solanum azureum.—Though nearly related to Solanum jasminoides, this plant is quite distinct in the color of its sky-blue flowers and in the shape of its leaves. It might, perhaps, be considered only a form of that well-known species in which the leaves and panicles of flowers are considerably smaller. The leaves of the plant are pinnately divided, with from five to seven, rarely nine, ovate segments. The loose, subaxillary panicles produce from twenty to thirty blue flowers with large yellow anthers. The leafy, slender stems grow to a considerable length and are of a bluish-green color. Like S. jasminoides, this plant is a very profuse bloomer and will do well under the same treatment. Side by side the two make a pleasing contrast, and both are well adapted to growing in vases, as well as on trellises and verandas, during the summer months.

Cultural Department.

Native Composites.

WHILE it is true that exotic plants are generally most appreciated in gardens, this is not always because they are more beautiful than native flowers. That the latter are not more commonly grown is often owing to the attempt to collect the supposedly rarer foreign plants and to the prevailing lack of observation which causes us to overlook the good points of our wildlings. The reaction of the last few years in the direction of greater simplicity and naturalness has had the happy effect of introducing many yellow native composites into cultivation. Many gardens are now rich with Sunflowers, the best of which are unexcelled at this season as showy, attractive objects. These, with the yellow Cone flowers and Silphiums, make a large class of invaluable plants to brighten up the garden at this season. But there is another group of plants whose merits are slightly appreciated in our gardens as yet, although they are typical American plants over which considerable glamour of sentiment and poetry has been thrown. The Asters or Starworts, while not flaunting and showy as the Sunflowers, are highly ornamental and desirable in the less formal parts of the garden. While Asters are perfectly hardy and will apparently exist under almost any conditions, they repay even a little care, and improve amazingly under cultivation, forming usually thrifty bushes covered with a multitude of star-like flowers, a condition in which they are seldom seen in the fields. As is well known, there are many species of Asters. They are difficult plants to determine botanically, and as they cross freely, outside of a few well-defined forms it is not easy to know the various kinds. The nomenclature is consequently much confused—at least, in gardens. Professor Gray made the subject his own, and cleared up many difficulties, but since his death there seems to be no recognized authority except his herbarium specimens. These flowers have long been great favorites in English gardens, and the names had become so confused that a few years since an endeavor was made to clear the nomenclature by growing specimens of all available kinds in the Chiswick garden of the Royal Horticultural Society. The plants were studied by botanists and gardeners, the species separated from the hybrids, and all determined and named according to the best knowledge available. I do not know of any large or nearly complete collection in the United States. If one had the space for them they would offer a most attractive field for collection and cultivation, and one would, besides, be doing a public service. Such a contract is entirely too large for my small garden, though I have two dozen kinds named at Chiswick, as a nucleus of what was intended to be a complete collection for comparison. However, if one only desired a few kinds for ornaments, a collection of a dozen kinds would be sufficient. Aster ericoides has hundreds of small white flowers. Medium white flowers may be found in forms of A. Novi-Belgii and A. versicolor, the latter changing to light mauve. But none of the medium-sized white-flowered Asters are as handsome and pure in color as those of the allied Boltonia. At Mr. Manda's the other day Boltonia asteroides, growing in a group of Asters, stood out boldly and distinctly among the other plants, and the purity of color was noticeable at a great distance. A. longifolius Lady Trevilyan, is the best large-flowered white Aster.

The best lavender or mauve colored kinds are forms of Aster lævis. Of the darker kinds our dark purple A. Novæ-Angliæ is too common to need description. The rose-colored forms, however, are much handsomer, A. roseus having flowers of equal diameter with fewer rays of a clear rosy shade. A. ruber is a smaller flower with numerous rays and of a darker rose shade.

There is a great difference in the habits of the different Asters, some being sparingly branched and some densely furnished; some are dwarf, others very tall. There also is a difference in the closing habit of the flowers. A. Novæ-Angliæ seems to close the earliest and closest in the evening, and some of the others do not close at all.

Elizabeth, N. J. *J. N. Gerard.*

Chrysanthemums.

SPECIMEN plants should have completed their growth by this time. Until now our object has been to develop as many growing shoots as possible; after this the plants will need to be tied into shape by a proper distribution of the shoots, always guiding the strongest toward the centre. This work should be done at once, so that the plants may lose some of the characteristic stiffness which comes from training. These instructions apply to trained specimens; plants which have been allowed to grow naturally will, of course, be considerably taller and irregular in outline, and to many persons such plants have a greater charm. But even these need some tying, which should be done neatly, and the stakes hidden as much as possible. As with trained specimens, the stake should take as much as possible the line of the growing shoot, and always be placed behind it and topped to the last tie. A heavy stake, longer than is required for support, should not be used with a slim shoot. While this work is going on the earliest varieties will be showing their flower-buds. Disbudding should be commenced at once and continued every day. Not all the buds can be taken off at once, but the work should proceed gradually, and the last one be removed only when it is certain that the bud we need is perfect in form and is taking the lead in growth. I have noticed a tendency in some varieties, more especially in I. Delaux, G. Daniels, Arethusa, Amber Gem, and this year's novelty, Chrystallina (Vaughan), to show crown-buds at taking time. As this occurs well into September, I always take them. If they were removed, terminals would appear, but so late in the season that it is questionable whether they would develop flowers of as good quality as the crowns. I would advise the retention of all crown-buds appearing on specimen plants in September.

Feeding should be continued until the blooms begin to show color, but less frequently and in less quantity. One guide in regulating the use of stimulants, in addition to noting the general effect on the plant, is to observe whether new roots appear on the surface of the soil. Whenever they do we can be certain that the food has been properly given and is doing good work. If no roots appear, little can be done to remedy the mistake of overfeeding. If the mistake is made of giving an overdose of guano the pot should be immersed to the rim in a tub of clear water. This treatment will act as a dilutant. Some damage will result, and a loss of leaves follow, but we may still preserve the plant in presentable shape. If, however, the effects are gradual, it is probable the bad results will not be discovered until it is too late to remedy the trouble. In this case we let the plants become as dry as possible without wilting, and give clear water only when moisture is needed.

The plants should be housed by the first of September. They can be left out-of-doors longer, but nothing is gained by the delay. They are better under cover, and from the first of October onwards will be benefited by keeping the air dry at night. This prevents damping and mildew. It is necessary to admit an abundance of air, but draughts must be guarded against.

Plants intended for specimen flowers will be showing crown-buds and terminals in all gradations. It is difficult always to exactly define these buds. Crown-buds are always bracteate, but there are so many degrees of development that it is difficult to tell, for instance, what we know as a second crown from a true terminal. The second crown is a valuable bud on which a large number of varieties do better, if anything, than on terminals. The terminal, or last bud, is the safest always when we are in doubt. It may lack size, and sometimes depth, but it always shows the best color, and the stem is sure to be well clothed with foliage. A second crown-bud on such varieties as William Seward, J. Shrimpton, G. W. Childs, Domination and Inter-Ocean will always give a show flower of great depth. E. Dailledouze is better on a terminal. So we might go on. Experience is the best guide. What is essential is to know which bud is best for our purpose and make a note of the fact.

Wellesley, Mass. *T. D. Hatfield.*

The Grapes of the Year.

FROM a collection of more than eighty sorts I should select the following as indispensables, for everybody: Brighton, Niagara, Worden—one red, one white, one black. But I should wish to add Herbert black, Hayes white, and Lindley red. Lindley, however, is very long-jointed for a good vineyard grower, and requires too much room. The two best very early Grapes are Moore's Early and Green Mountain. Diamond, contrary to expectations, is not an early grape to be relied on. It ripens sometimes in August, and again all along through September. It is every way freaky. Vergennes is another exceedingly useful red grape. Its quality is not highest, and it has a very thick skin. Gaertner is a red grape that should be graded very high. It is among the earliest. For late keepers I select Diana and Pocklington, both enormously prolific, and both of a peculiar musky flavor, but fine. The bunches are very compact and heavy. For choice grapes worth extra care and winter protection, I cannot afford to dispense with Iona, Goethe or Dutchess. The latter is early and a poor keeper; the two former are excellent keepers. Jefferson will not ripen here oftener than one year out of ten. For training against barns and outbuildings I know no better Grape than August Giant. It is really excellent in quality, and for growth has no rival. For home use it may be added to the three indispensables for the table—Brighton, Worden and Niagara. As Brighton is a bad self-pollenizer, it must invariably be grown alternately with Niagara or Worden or other Grapes.

Thoroughly good grapes can only be grown in a warm, open exposure. Trellises should, if possible, run north and south. A swale facing south-east, with rich, loose clay soil, is most satisfactory. When the exposure is bad there is delay in fully ripening at the proper date, but the leaves at that time begin to fail in elaborating the sap, and consequently the grapes never become quite perfect. I have learned the need of hastening the ripening of our grapes. Lindley trained against my barn is ripe two weeks earlier than on a trellis that is slightly shaded, and the quality is incomparably better. No grape-grower can ever afford to be without Bordeaux mixture. I have invariably applied it of late with kerosene emulsion. In fact, I have learned to use the emulsion with all sprays, on all sorts of vegetation.

A peculiar feature of grape-culture for this season has been that along the whole Grape-belt a severe freeze in May destroyed the whole new growth, including all the buds and blossoms. But the very severity of the cold led to an entirely new growth from dormant buds, and from this a fairly good crop of grapes has resulted. What is also surprising is that this secondary crop has ripened considerably earlier than any grape crop in twenty years.

Clinton, N. Y. *E. P. Powell.*

The Vegetable Garden.

THE weather has been so unseasonably warm that we are apt to forget that cool nights are due, and a sudden frost may come as a surprise north of New York any time after the middle of September. Celery will not be making its best growth until the temperature at night is comparatively low, but it will whiten much more rapidly in the latter part of September than it will in late autumn. The plants which are required for early use should have a little finely pulverized soil drawn about them once a fortnight, although, of course, it is too early to earth up the main crop. Of course, Celery should never be handled while it is wet with rain or dew. The rusted leaves should be picked off as they appear, the ground should be kept clean, and the plants should never be allowed to lack water.

Lettuce can be sowed in the open ground and pricked out in cold frames, but it will not always mature before frost. In open autumns, if the ground is kept clean, plants will head in November, and the rest of them in winter. Of course, sashes should not be used before heavy frost, except to protect the plants from beating rains.

In warm beds with a southern slope Spinach, if sown now, may furnish a few plants for use before winter, but in any case it will be good for spring use. The round-seeded variety is rather more prolific than the prickly-seeded, but it needs more protection.

Cut off the Asparagus as soon as it begins to turn yellow, and before the seeds fall to make bad weeds next year. The tops ought to be burned, as this will in some degree discourage the attacks of the beetle.

Where the larger kinds of Cabbage begin to burst, the roots should be loosened with a fork, and all Cabbage and Cauliflower which is still making any growth should be frequently hoed. If freezing weather catches the Cauliflowers before they have made full-sized hearts, they can be kept for winter use by heeling them in closely in cold frames.

If plants of Water Cress are set in a frame now, and the soil is kept damp, they will begin to make a new growth. If the frames are carefully banked up so as to exclude the frost they will furnish a much-prized relish in winter.

Montclair, N. J. *R. A.*

Asparagus Sprenglei.—This plant, as well as Asparagus decumbens, can be grown to excellent advantage in hanging baskets for stoves and greenhouses, and even for veranda decoration in the summer months. In high-roofed stoves, especially where the plants in them are not tall enough to fill up the space, both these species will be found very useful. The former makes growths sometimes six feet long, beautifully branched and hanging naturally over the sides of the basket. The leaves are comparatively large and bright green in color. If in a healthy condition the plants will produce at least two crops of flowers each season, and the flowers are very attractive, being almost pure white and arranged in short racemes. A. decumbens is much smaller than A. Sprenglei, but none the less attractive, the stems being closely branched. Both plants are easily increased, either from seed or by division of the crowns.

Botanic Garden, Washington, D. C. *G. W. O.*

Variation in Corn.—In observing several varieties of Corn last year it was noticed that in the same variety there was a marked variation in the number of rows upon the ear. For example, in the kind known as Portland we found ears having eight, ten, twelve, fourteen and sixteen rows. It was not till late in the season that this variation was noticed, and, therefore, extended observation could not be made to determine the prevalence of this characteristic in different varieties. This season about a hundred varieties have been examined, and two-thirds or more of these show variation in the number of rows on the ear. We have found two ears on the same stalk, each having a different number of rows. This presents an interesting aspect of variation in cultivated varieties which have been produced from crossing. The many varieties of Sweet Corn have sprung from others which differed originally in the number of their rows, and this fact now appears in most of the cross-bred kinds in the form of row-variation. In other words, while some of the characters of the cultivated crosses seem to be established, so that they are reproduced with reasonable certainty, all the characters are not definitely fixed.

Native Plums.—The following varieties of native Plums are in fruit this summer at the experiment station: Marianna, Wild Goose, Wooten, Quaker, Wayland, Forest Garden, Weaver, Transparent and Golden Beauty. The native Plums are favorites of the curculio, and one to four slugs appear on every fruit. Hardly a trace of the rot is to be seen on these varieties. The Marianna and Wild Goose have already ripened; the Quaker and Wooten are now ripening, and the remaining varieties are green.

Age of Bordeaux Mixture.—It has been shown by Mr. Lodeman, of the experiment station, this season, that after the Bordeaux mixture has been prepared a long time it precipitates more rapidly when mixed with water than when newly made, and, therefore the older it is the more it must be agitated. In applying it to Potato plots for blight, which required one knapsack sprayer of material for each plot, the portions sprayed first are comparatively free from the disease, while those sprayed with the last of the material in each knapsack are as badly affected as the check plots, showing that the Bordeaux quickly precipitated, and was used up in the first delivery from each sprayer. The Bordeaux used in these experiments was made in May. Plots sprayed with the mixture made at the time of each application show that the material was distributed uniformly over the entire plot, for here the blight is evenly checked.

Cornell University. *G. Harold Powell.*

Correspondence.

The Sacred Lotus in Egypt.

To the Editor of GARDEN AND FOREST:

Sir,—In the issue of GARDEN AND FOREST for August 21st Mr. Day makes mention of the leaves of Nelumbium speciosum from Egyptian catacombs now preserved in the Abbott collection in New York City. I have not seen the collection, which I know by reputation to be a very complete and valuable one, and the fact that specimens of the leaves of the Sacred Lotus exist there is most interesting. As far as I know, neither leaves nor flowers were on exhibition at Giseh when I examined the collection there two years ago and made notes on the spot.

In a review of Dr. Bonavia's *Flora of the Assyrian Monuments* in the same number of GARDEN AND FOREST nothing is said of the chapter dealing with the Lotus. Dr. Bonavia claims that Nelumbium speciosum never existed in Egypt, and that the Rose Lotus was the red variety of the white Lotus, Nymphæa Lotus. And the reason he gives for the statement is, that "it is not likely that a plant like the Nelumbium, so easily propagated by seed and root, would have disappeared from Egypt had it been there," which statement seems somewhat remarkable in the face of many similar examples of plants which are absolutely known to have flourished in Egypt thirty centuries or more ago, and are now no longer seen there. The Papyrus is one instance. The original home of Cyperus Papyrus is a matter of question, too, for Boissier claims that it grows spontaneously in tropical Africa, in Abyssinia, Nubia and Syria, having been brought there from Egypt, and from being spontaneous in the latter country it has retreated further south as a result of the change in the Egyptian climate.

It would take too much space to enumerate here the plants which have disappeared from Egypt since Pharaonic times. But, to return to the Sacred Lotus, it would seem as if it had been too well described by classical authors to be questioned, even in this doubting nineteenth century. Theophrastus, Herodotus and Strabo each, and in various ways, describe its rounded, peltate, concave leaves, rose petals and peculiar fruit too plainly; and the fact that still in the far east the statues of the gods stand on Nelumbium-shaped pedestals seems to go to prove that through Asia, from time immemorial, the plant has had divine significance, for in the east things do not change rapidly, and the sacred things of yesterday are very apt to be those of to-morrow.

I have not seen any record of the finding of the plant in tombs of Pharaonic periods, and it will be very interesting to learn the "provenance" of the leaves mentioned by Mr. Day. It has been found in the Græco-Roman Necropolis of Hawara, which would seem to settle the question, as, if it occurred in Egypt then, it could scarcely have been a novelty in the country. But at that time the old Egyptian religion was in its decadence, and the plant had probably lost its sacredness, and may have been put to many uses forbidden in older, orthodox centuries.

The hieroglyphic name of the Sacred Lotus, according to Monsieur Loret,* was Neheb, changing later to Nekheb and Nesheb, and the oldest rendering of it is seen in the funeral texts taken from the pyramid of Pépi I. The name of the White Lotus, Nymphæa Lotus, was Soushin, and that of the Blue Lotus, N. cœrulea, was Sarpat. The terminal hieroglyphic sign in the rendering of the name, an outline of the flower, is, in the case of the three forms of the name of the Sacred Lotus, the same, and much larger, longer and of an entirely different shape than the one terminating the spelling of the names of the White and Blue Lotus. This also would seem to prove that the plants were radically different, and were known to be different, and also that the similarity of the two Water-lilies was recognized.

The Sacred Lotus was made to serve as the cradle of Horus, the God of the Rising Sun, and to its habit of closing its petals in the evening and often disappearing under water for the night may be attributed the reason of the very important rôle it played in the Egyptian solar myth.

East Hampton, L. I. *Anna Murray Vail.*

Air Drainage.

To the Editor of GARDEN AND FOREST:

Sir,—I note with much interest the observations of Dr. Hoskins upon the importance of atmospheric drainage in fruit-culture.

During the last six years I have been so situated in the fruit-growing districts of western New York and upon the prairies of Dakota as to have exceptional opportunities for observing the importance of this almost unheeded element of local climate, and during the growing season of 1894, and again this year, I have noted its influence. In 1894 late spring frosts did considerable injury in districts not well drained aërially, and this season the injuries have been intensified. Frosts have occurred during each of the growing months of the year, and in each case ice has been formed in the draws and valleys, and Corn and Potatoes, while not entirely killed, suffered a severe check, the marks of which are visible until the present time. The more elevated portions escaped with slight injury to these tender plants.

A notable example was presented on the morning of June 28th, when Corn, Potatoes and other tender annuals growing upon the flats along the Sioux River were severely frosted, and as the land rises gradually for some four miles from the river to the experiment station grounds, a gradual lessening of the injury by the frost was noticeable until the station

* *La Flore Pharaonique.*

grounds were reached, where no damage even to Tomato-plants could be detected. These, however, are upon one of the most elevated portions of the prairie in the vicinity, and the land here is not level, but has a gradual descent to the east of about five feet in thirty rods. Other and quite as marked examples of the value of air drainage are afforded by the very slight undulations of the comparatively level prairie. It is not unusual after a late spring frost to see in a Corn-field an area of four to six square rods perceptibly touched by frost, while the remainder of the field is unhurt.

In the grape-growing districts of western New York the limits of the successful cultivation of such valuable varieties as Isabella and Catawba are determined by no greater factor than air drainage. The sections in which these late varieties can be successfully grown are confined to narrow strips bordering the larger inland lakes and rivers. Outside the limits of this area experience has proved that the cultivation of these varieties is unprofitable, because their season of ripening is late, and, therefore, fall frosts are liable to catch the crop yet upon the vines; near the rivers and lakes the ameliorating influence of the water is sufficient to ward off the frost.

In the west this question is of vastly more importance than in New York state, as late spring frosts and early fall frosts are much more frequent, and, although the prairies are comparatively level, slight differences, as of two to ten feet, in elevation often mark the line between success and failure with the tender annuals as well as with fruits. At present it has a more important bearing upon garden annuals than upon fruits, but in order that future fruit interests in these sections shall not suffer from a lack of knowledge of this factor, it is well that every fruit-grower and prospective tree-planter should be informed of its importance.

State Agricultural College, Brookings, S. D. *L. C. Corbett.*

Double Sweet Peas.

To the Editor of GARDEN AND FOREST:

Sir,—Several plants obtained from "Eckford's Grand Mixture" of Sweet Peas show a strong inclination to become double. Some simply have the standard deeply lobed, or, in some instances, divided; others show more elaborate modifications. For instance, one has two complete standards side by side; one of these bears at its base a small lobe reversed upon the main part, while opposite the keel is another extra petal-like appendage, terminating in a pollen-bearing anther. The essential organs are apparently normal. Another, which approaches nearer to the ideal, presents one standard partly in front of the other; both are of good size and symmetrical. In the rear of these the calyx has developed an extra sepal almost as long as the standards and as highly colored. The light and dark reds show these variations most plainly, but they are also prominent in a light yellow variety. So many pronounced freaks in a single season seem to indicate that where any variation has once occurred others are likely to follow.

Harmonsburg, Pa. *B. L. P.*

Quercus Phellos × rubra in Missouri.

To the Editor of GARDEN AND FOREST:

Sir,—On page 366 of my *Trees, Shrubs and Vines of Missouri*, I have written at some length on this hybrid Oak, the old Quercus heterophylla of Michaux, giving my reasons for thinking that it did not occur in Missouri, at least in the previously reported localities. There having been so much obscurity about the parentage of this noted tree, and not feeling certain that Mr. Hollick's combination was any more correct than Dr. Engelmann's, I had about come to the belief that the hybrid was the result of several different crossings and not the offspring of any two certain species, as had been supposed, and hence my doubts expressed as to its occurrence in Missouri.

A slip of the pen in my note on page 366 of the current volume of GARDEN AND FOREST makes me say Red Oak instead of Scarlet Oak, which changes the status of things decidedly, and thereby allows me to show that the hybrid collected is really Quercus Phellos × rubra. Having had abundant opportunity to study the Dunklin County tree this season, I can, without hesitation, say that it represents Q. Phellos × rubra, and is described as follows: Tree much resembling the Red Oak in trunk, branches and general appearance; branchlets densely tomentose, the density and character of the tomentum being that of Q. rubra when young, but soon becoming smooth and polished; buds large and smooth, ovate and pointed, very similar to those of Q. rubra, but smaller; leaves heterophyllous, the greater proportion of them being nearly like those of Q. Phellos, with some forked and lobed, very thick, shining above, densely tomentose beneath when young, but becoming nearly smooth in age, with lobes shortly bristle-tipped, the Q. Phellos form, which I have indicated as No. 610, having very short petioles, and the Q. rubra form, which I have kept separate under No. 610, having slender petioles about one inch in length; fruit much like that of Q. rubra, but much smaller, somewhat approaching that of Q. Phellos in shape.

Only one tree was found, and this is standing in a piece of low wet woods 200 feet south of the railroad track and about one-half mile east of the station at Campbell. The principal growth here is Oak, of which Quercus Phellos, Q. rubra, Q. minor, Q. alba and Q. velutina are the only species present, and these occur in abundance in the order given. The trunk is about fifteen inches in diameter three feet above the ground, and the height was estimated at sixty feet. At a distance the tree very much resembles the Willow Oak.

This hybrid differs from Quercus Phellos in the forked and lobed leaves, which are tomentose when young, with bristle-tipped lobes and long petioles; the larger and different-shaped fruit, and the larger and different-shaped buds. It differs from Q. rubra in the narrow entire leaves, which are very shortly petioled, the smaller and more rounded buds, and the smaller, slightly different-shaped fruit; from Q. velutina in the different-shaped fruit, entire leaves with their short petioles, and smaller smooth buds. It is not related to Q. digitata, which is common at Campbell, but not seen near the piece of woods where this tree stands; nor to Q. imbricaria, which is also found near Campbell, though rarely; nor to Q. Texana, which is found on the hills near Chalk Bluff, but not commonly; and there are no other species of Black or Red Oaks in the immediate vicinity of this tree.

The hybrids found in De Kalb, Shelby and Sullivan counties by Broadhead, and in Cooper and Pettis counties by Swallow, are probably derived from Quercus imbricaria and Q. rubra, and not from the Willow Oak.

Independence, Mo. *B. F. Bush.*

Recent Publications.

Mr. J. G. Lemmon, of Oakland, California, has just issued, in convenient form, a *Hand-book of West-American Cone-bearers*, in which he records his observations upon the coniferous trees of western North America, gathered during years of travel in the forests of that part of the country. A view of an ancient Sequoia in the Tuolumne Big Tree Grove serves as a frontispiece to the work, which is further illustrated by a number of photographs of fruiting branches of species of the different genera described. Mr. Lemmon is an acute observer and a most enthusiastic lover of trees, and something of his skill in describing what he has seen appears in his remarks upon the Sugar Pine (Pinus Lambertiana), which we reproduce:

The Great Sugar Pine is the accepted, the crowned, prince of the Pine family. Not only by virtue of its unexcelled dimensions and the magnitude of its cones is it regal, but it is a most kingly monarch in its majestic, lofty bearing, its erect, self-asserting dignity, and its bowed head, obedient to its only masters—the powers above. Only the supreme emperor of the whole vegetable world, the immense Sequoia, also a denizen of our great Sierra forest, and admitting the Sugar Pine to fellowship, excels in dimensions (every way but in fruit) this noble, dominant tree of the whole western world.

The *West-American Cone-bearers* is sold by the author at $1.00 a copy, and is to be followed by a more comprehensive work on the same subject, which will be fully illustrated, and is designed "to present by comprehensive classifications and careful descriptions, both scientific and popular, the latest and most useful information concerning this family of important trees—unparalleled in their abundance in north-west America."

Notes.

The latest of the *Minnesota Botanical Studies*, being Bulletin No. 9, issued by the Geological and Natural History Survey of Minnesota, under the editorship of Professor Conway Macmillan, is devoted to a bibliography of American Algæ, by Josephine E. Tilden.

An expert in California, who has been trying different methods of extracting the odors from flowers, claims that he has

discovered a process by which he can compete successfully with the French distillers of perfumes. The great advantage of the new method is said to be that it extracts the odors from the flowers almost instantaneously, and in this way much time and labor is saved.

Mr. Carman, who has grown the Green Mountain Grape since 1889, writes that the more he sees of it the better he likes it. He pronounces it positively the earliest, and, for its season, the best of our White Grapes. The fruit on the Rural Grounds were ripe on the 20th of August this year. The quality is pure and refreshing, the seeds are small, the skin thin, but firm. The Early Ohio ripens about the same time, but the berries are sour and the flesh tough.

Leycesteria formosa is a shrub found in the higher parts of Nepaul and well known in English gardens. It is not hardy in this latitude, but Mr. Joseph Meehan writes to the *Country Gentleman* that, although it gets partly killed back in the winter-time, the young shoots come up every spring and flower in Germantown abundantly from July to November. The plant belongs to the Honeysuckle family, and bears pleasing light pink flowers, whose purple stems and calyxes are also quite attractive.

Mr. B. F. Bush, of Independence, Missouri, has reprinted from the State Horticultural Report of Missouri his *List of the Trees, Shrubs and Vines* of that state. Two hundred and ninety-four species are described, a number which can probably be slightly reduced. Betula populifolia, for example, which is admitted doubtfully, probably does not grow anywhere west of the Mississippi River. The list, too, is enlarged by two hybrid Oaks and by our Chestnut, which is not an inhabitant of any part of the region west of the Mississippi.

Mr. C. W. Garfield, in *The Rural New Yorker*, makes the suggestion that the American Pomological Society furnish the Government with a bulletin containing its fruit catalogue with the perfected nomenclature and the distinguishing characters which indicate values for different localities. When it is remembered that the publications of the American Pomological Society are limited in number and published biennially, it seems that the proposed method would be useful in giving a wider circulation to the results of the work done by the Committee on Fruits.

Dr. F. Franceschi has brought together, in a volume of eighty-eight pages, under the title of *Santa Barbara Exotic Flora, a Handbook of Plants from Foreign Countries Grown at Santa Barbara, California*, a series of articles first contributed by him to the *Santa Barbara Press*. There is probably no better spot in North America for a garden than the coast of southern California, and the number of exotic species that can grow there is very large. Dr. Franceschi's publications will certainly stimulate a taste for gardening in California, and his efforts to enrich the exotic flora of his adopted state will be watched with the greatest interest by all Americans interested in horticulture.

We have received from Meehans' Nurseries specimens of Cedrela Sinensis in fruit. It has flowered for several years in this country, but we have never before seen the seed, and should like to know if it has been produced elsewhere. The tree in its general appearance resembles the Ailantus, and, perhaps, it might be used here to advantage as a street-tree in places where the Ailantus is objected to on account of the odor of its flowers. The tree is a native of the northern parts of China, and it is not improbable that a strain of the species may yet be established here which will be hardy throughout New England, where it is now rather tender.

We have heretofore given several methods of saving unripened tomatoes which remain on the plants when the first frost comes. On this point, Professor Massey, of the North Carolina Experiment Station, writes that when frost is imminent he gathers the green tomatoes, wraps them separately in paper (old newspapers will answer), and packs them in boxes, which are stored in a place just warm enough to be secure from frost, the object being to keep them and not to ripen them. Then, as the fruits are wanted, a few are brought out at a time and placed in a warm position, where they will ripen in a few days. In this way he has kept his table supplied with sliced tomatoes up to midwinter.

A dispatch from London to *The Sun*, of this city, states that this year there has been such an enormous crop of plums in Great Britain that the price for the fruit has fallen to twopence a pound, which is so little that it does not pay the cost of gathering and freight. One would naturally have supposed that the growers would have made haste to dry the fruit, since England pays annually two million dollars for dried plums imported from France. English farmers are extremely conservative, however, and they sat still and allowed the fruit to fall on the ground and rot. It may be that these plum-growers can give some reasonable excuse for their failure to meet such an emergency. Farmers and fruit-growers are often accused of a lack of enterprise when in reality it is practically impossible to solve offhand the problems which suddenly confront them.

Professor Lazenby, of the Ohio Experiment Station, in making tests for ascertaining the purity and vitality of seeds, notes the remarkable power of re-germination which is exhibited by various species. Different samples of Wheat germinated no less than ten times after intervals of a week or more, during which time the seeds were kept perfectly dry. Corn will germinate nearly as often. Clover and the grass seeds germinate but once, as a rule. This helps to explain why a good stand of Grass or Clover is difficult to obtain in unfavorable seasons, while failure with Wheat or grain from alternate wet and dry conditions seldom occurs, provided the seed is good. It may also be one reason why certain garden seeds will endure much greater neglect than others.

The Rev. W. T. Hutchins writes to *The Florists' Exchange* that the quality of the newer Sweet Peas is endangered by the enormous production of seed in California and perhaps elsewhere. It is complained that some of the improved types are losing their fine shell-shaped and hooded form and have a narrow, reflexed look, and in this half-deteriorated and washed-out condition they are not as good as the old sorts from which they were originally developed. The reason for this is that proper care has not been taken to hold the plants up to a rigid standard. In order to retain the highest quality something more is needed than merely pulling out the rogues or plants which show a bad color. Every single plant which shows any deterioration should be removed, or else the best of the varieties will revert to ancestral types. Of course, such rigorous care cannot be exercised where seed is sold at present prices, but, unless the seed is grown distinctly for quality rather than for quantity, the deterioration of flowers is sure to follow.

In the markets, cranberries, crab-apples, quinces and small yellow tomatoes, for preserving, indicate the autumn season in fruits, although all the middle and late summer fruits and vegetables are yet fairly represented. Lemons still command unusually high prices, notwithstanding the drop of forty to fifty degrees in temperature since the middle of last week. The supply of this year's crop from the Mediterranean for the remainder of the season is said to be only one-third of the quantity imported for the same term a year ago, and choice Majori fruit during the past week sold for $8.25 a box at wholesale. With the last California seedling oranges, brought out of cold storage, now appear the earliest Jamaica oranges, the first large shipment of which fruit is due here to-day. Flame Tokay grapes, with a fine lilac-bloom on the red skin, and large Kelsey plums, with their different shades of mingled purple and yellow, were among the showiest California fruits of the fifty-two car-loads sold in this city last week. Some Purple Damascus grapes are also now coming from the western coast, with the long-berried Black Cornichons and Rose of Peru. George's Late Cling is one of the varieties of peaches most frequently seen now, a large white-fleshed fruit, the yellow skin striped and splashed with bright red, and said to be among the most profitable kinds grown in California. Picquet's Late, a free-stone, introduced from Georgia, is another good sort now coming from the west. The preference is, however, for eastern-grown peaches, even though these are small and unattractive in appearance.

Charles V. Riley, the well-known entomologist, died in Washington on Saturday night from injuries received in a fall from a bicycle. He was born in London in 1843, came to this country at the age of seventeen years and settled on a farm in Illinois. He served as a soldier in the last years of the war, and after some experience in journalism he was made state entomologist of Missouri, which position he filled for nearly ten years. His work in that state attracted much attention, and in 1878 he came to Washington, where, until last year, when he resigned his position, he has practically supervised all the entomological work carried on by the Government. Mr. Riley was a tireless worker, with an aptitude for original research, and many of his published papers are of permanent value. He had a talent, too, for political management, and for many years he was recognized in the Department of Agriculture as one of the forces in directing its policy and selecting its agents.